RENE UMEH

E-mail: dubemrene@gmail.com **Webpage:** reneumeh.github.io

EDUCATION

03/2020 – 08/2024 BSc Mechanical Engineering | Hanyang University *(Seoul, South Korea)*
- **GPA**: 4.01/4.5 *(summa cum laude)*
- **Certifications**: Accreditation Board for Engineering Education of Korea Certification, CNC Station Certification.

01/2022 – 05/2022 International Exchange Program | University of Texas at Austin *(Texas, USA)*
- **GPA**: 4.0/4.0

RESEARCH & WORK EXPERIENCE

09/2023 – Present Research Assistant | Hanyang University (Advisor: Prof. Kim Douglas Deok Su) *(Seoul, South Korea)*
- Represented the output of Voronoi diagram tessellation algorithms as 3D satellites, orbits, and collisions on an interactive platform.
- Designed and deployed a custom GPT for translating mathematical collision avoidance maneuvers into natural language.

06/2023 – 08/2023 Research Intern | Korean Institute of Science & Technology (Advisor: Dr. Lim Hwa Sup) *(Seoul, South Korea)*
- Trained and fine-tuned the performance of an image to 3D reconstruction generative AI model based on PiFU architecture.
- Created a synthetic database of 200 3D collision-free scenes including animated characters and furniture using Nvidia Omniverse.

09/2022 – 05/2023 Student Researcher | Hanyang University (Advisor: Prof. Kim Min Gu) *(Seoul, South Korea)*
- Simulated the influence of a semiconductor LPCVD reactor's geometry on temperature distribution and uniformity of silicon wafers.
- Concluded that an inverted Venturi tube design results in a 45% increase of WIWU in central wafers and a 2% increase in WTWU.

06/2022 – 08/2022 IT Intern | Rice University with Lavner Education *(Houston, USA)*
- Maintained database for students, fee payments, and registrations. Processed financial reports and responded to user requests.
- Prepared and taught separate weekly lesson plans for middle to high school students on IT-related courses (3D printing, coding etc.).

EXTRACURRICULAR ACTIVITIES & PROJECTS

09/2023 – 12/2023 Mechanical Engineering Team | Cheil Jedang Foods *(Seoul, South Korea)*
- Redesigned conveyor screw for dumpling manufacturing, reducing dough retention by 23% and power consumption by 18%.

09/2022 – 09/2023 Student Council President | Samsung Dream Scholarship Foundation *(Seoul, South Korea)*
- Organized student outreach and networking programs. Secured funding for council's yearly budget and prepared financial reports.

11/2020 – 06/2023 Mechanical Engineering Team | Hanyang RACE club *(Seoul, South Korea)*
- Optimized racecar suspension A-arm reducing weight from 9.8kg to 7.5kg and maximum stress from 348Mpa to 301Mpa. Analyzed and modified racecar chassis system, increasing torsional rigidity from 1920Nm/deg to 2010Nm/deg.

03/2023 – 05/2023 Meal Service Volunteer | Seoul Senior Welfare Center *(Seoul, South Korea)*
- Assisted in preparing and serving meals to elderly community members. Led the sanitation team, handling dishwashing and clean-up.

SCHOLARSHIPS & AWARDS

2024	**Highest Graduating Honors	Hanyang University** *(Academic | Institutional)*
2022 - 2023	**Samsung Global Hope Scholarship	Samsung Dream Scholarship Foundation** *(Academic | National)*
2021	**Global Korean Excellence Scholarship	Korean Government Scholarship Program** *(Academic | National)*
2020 - 2021	**Hanyang International Excellence Award	Hanyang University** *(Academic | Institutional)*
2019	**Korean Language Excellence Award	Hanyang Institute of International Education** *(Academic | Institutional)*
2018	**Best Graduating Student (Valedictorian)	St. Gregory's College** *(Academic | Institutional)*

SKILLS & PERSONAL DEVELOPMENT

- **Programming Languages and Frameworks**: Python, C++, MATLAB, JavaScript, HTML, CSS, Typescript.
- **Engineering CADs**: SolidWorks, AutoCAD, Catia, Ansys Fluent.
- **Spoken Languages**: English (Native Speaker), Korean (Fluent).

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Hanyang University – Mechanical Engineering

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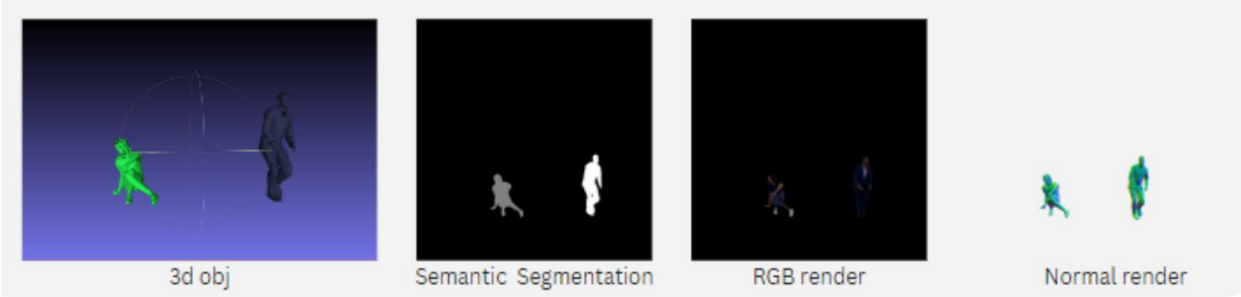
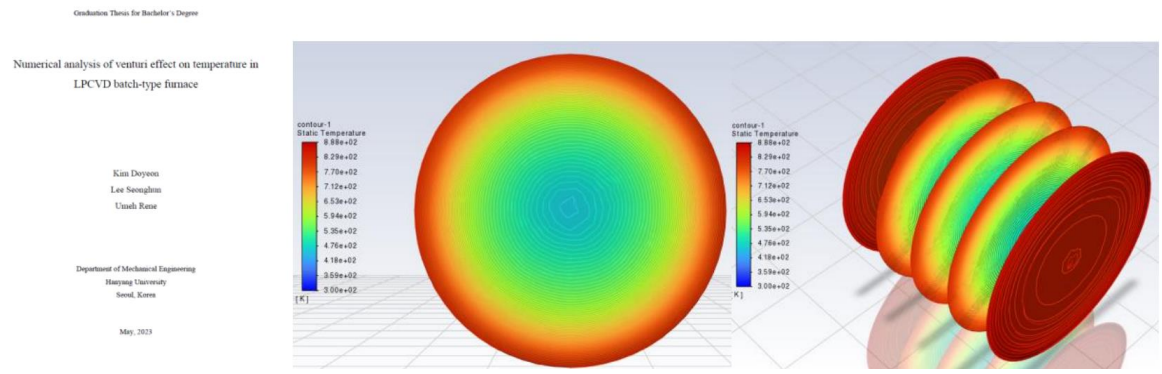
CONFIDENTIAL – Korean Institute of Science & Technology



Goal	Process	Result
• Train and fine-tune a model capable of generating 3d representations of 2d instances.	• Created a synthetic 3D dataset using NVIDIA Omniverse for training the model including RGB, normal, depth renders, and joint information of human characters, specifically focusing on break dancing scenes and scenes containing furniture.	• Created a dataset of 200 unique scenes containing characters and furniture and trained a 3D prediction model.

Bachelor's Degree Graduation Thesis – Hanyang University



Graduation Thesis for Bachelor's Degree

Numerical analysis of venturi effect on temperature in LPCVD batch-type furnace

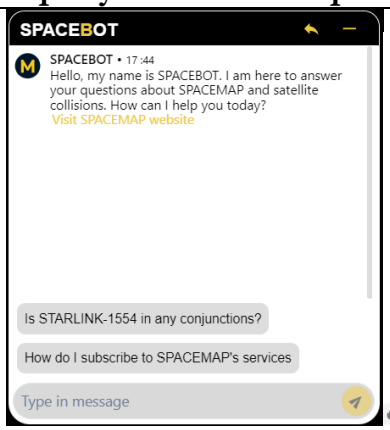
Kim Doyeon
Lee Seonghun
Umeh Rene

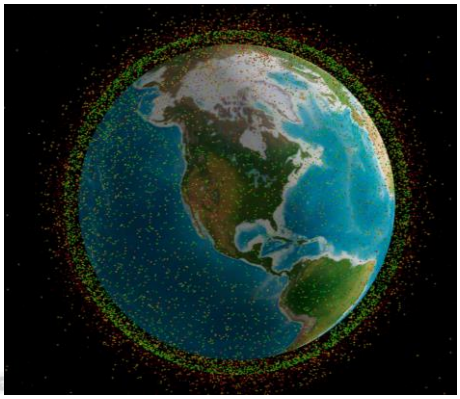
Department of Mechanical Engineering
Hanyang University
Seoul, Korea

May, 2023

Goal	Process	Result
• Numerical Analysis of the Venturi Effect on the Temperature Distribution in an LPCVD (Low-Pressure Chemical Vapor Deposition) batch-type furnace. [Increase the uniformity of silicon wafers]	• Performed calculations to determine the estimated effect of changing the geometry of the reactor. Performed simulations using ANSYS Fluent to corroborate calculation results. Calculated the effect of temperature change on deposition uniformity using MATLAB.	• Determined the effect of the temperature distribution on the thickness of the oxide layer on the wafers were performed. Obtained the optimum radius for this an inlet/outlet radius of 0.145m

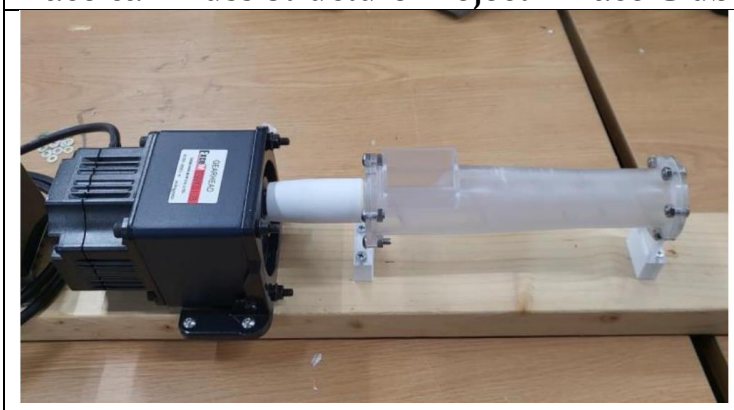
Company Chatbot & OpenAI Integration – SPACEMAP Inc

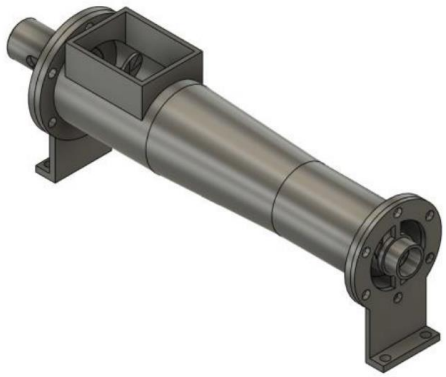




Goal	Process	Result
• Create a chatbot interface and a custom GPT using OpenAI's services and the company's APIs.	• Created a backend endpoint to handle message input, OpenAI API calls, Company API calls, and output using **Next js**. • Designed and created frontend UI/UX for chatbot using **React**. • Created custom GPT using APIs	• Successfully created and deployed chatbot and custom GPT, accounting for 20% of all API calls in the first 3 months.

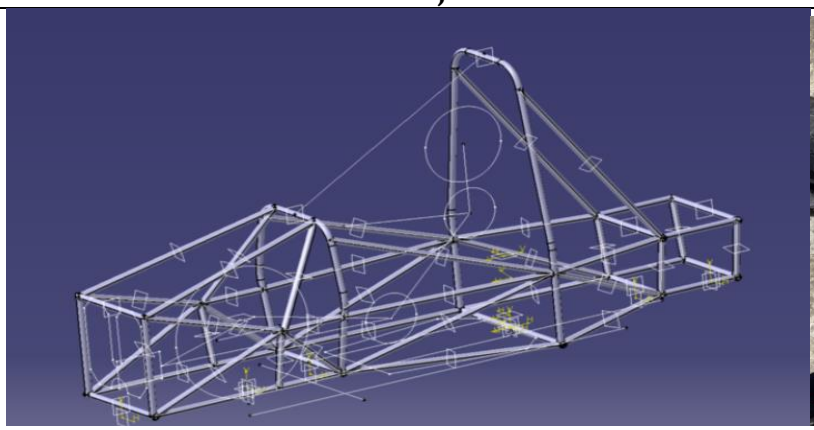
Race car Truss Structure Project – Race Club





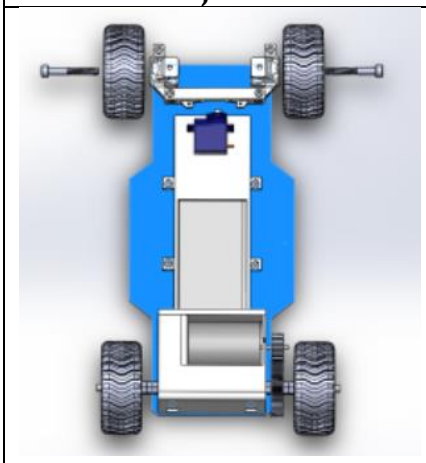
Goal	Process	Result
• Redesign the screw used for kneading and conveying dumpling dough.	• Created design considerations for the screw (modularity, speed, retention of food particles, high shear rate zones) • Made design adjustments and calculated the estimated effect of design adjustments. • Performed simulations on ANSYS Fluent and miniature models to corroborate calculation results	• Adjusted flight angle, clearance & screw pitch to reduce retentions of food particles and increase regions of high shear rate. • Created a more modular and easier-to-maintain design for the screw

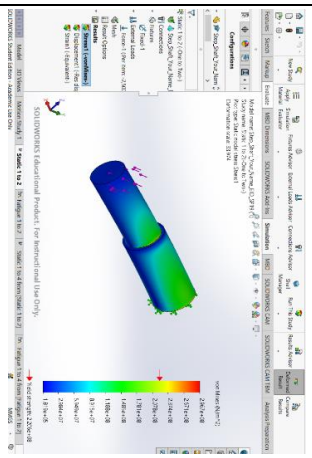
Race car Truss Structure Project – Race Club

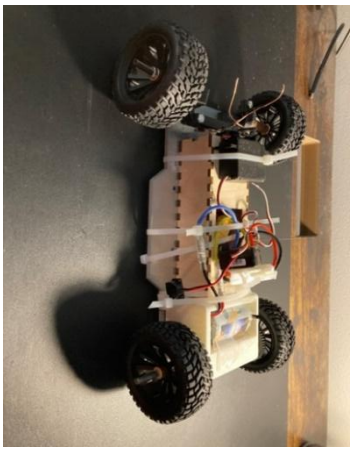


Goal	Process	Result
• Analyze the previous truss structure of the car and propose a better truss structure to increase structural rigidity.	• Used **Catia** to analyze the structural stiffness of truss structure and load. • Cut and welded pipes in the workshop.	• Increased torsional rigidity by 9%, from 1920Nm/deg to 2010Nm/deg..

RC Car Project – Machine Elements Course

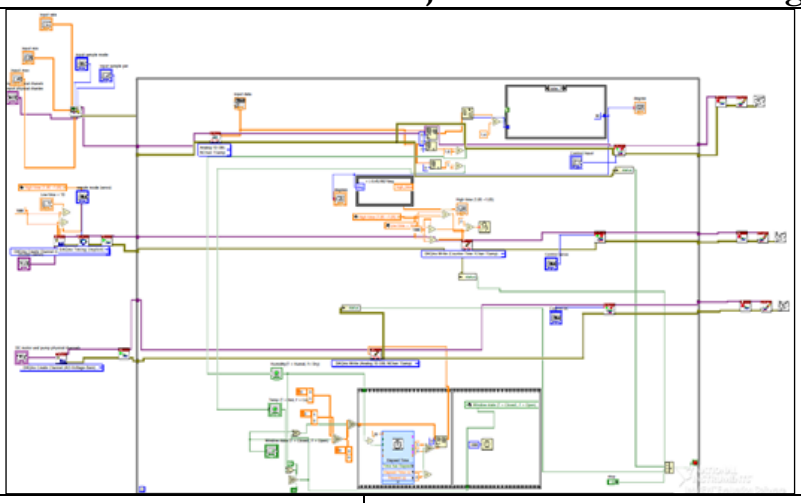


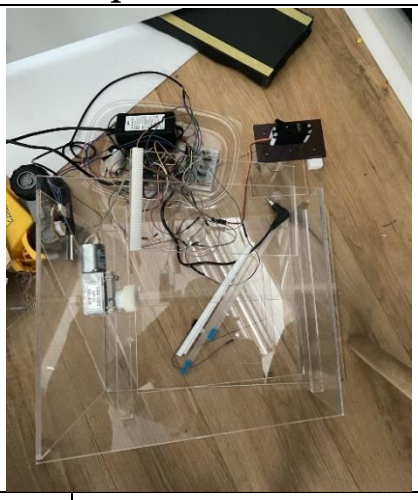




Goal	Process	Result
• Build an RC car with a $50 budget. • Design the RC car to be dynamically safe while optimizing speed.	• Designed and analyzed chassis, axle, steering, drivetrain, and joints using **SOLIDWORKS**. • 3D printed or ordered parts from suppliers.	• Designed the car to withstand collisions at a maximum speed of 10 m/s. • Placed third place in the driving competition.

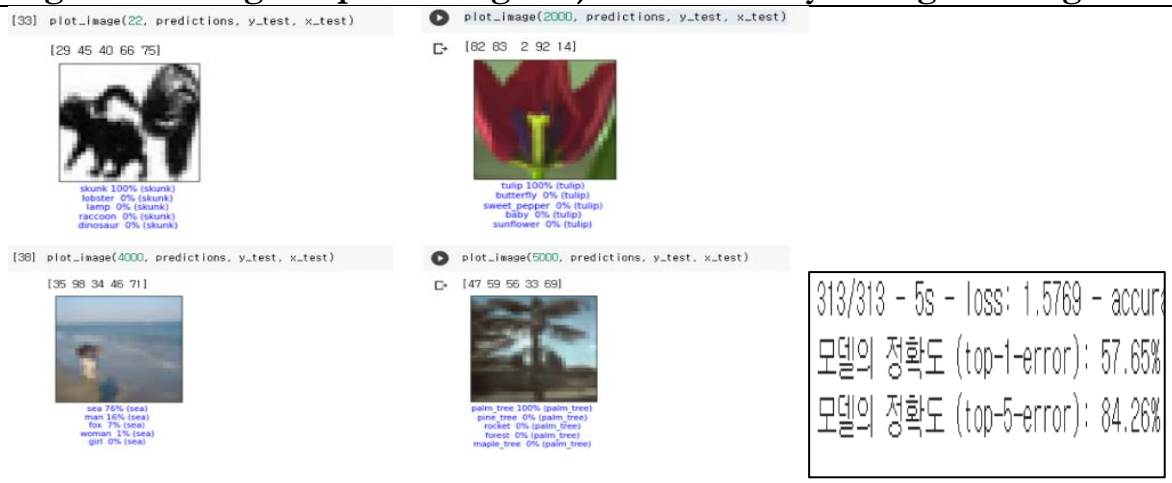
Automatic Greenhouse Project – Mechanical Design & Experiments Course





Goal	Process	Result
• Create a model for an automated greenhouse with a budget of 100,000 won.	• Used **LABVIEW** to create a program that processes light, humidity, and temperature signals from sensors. • Purchased motors, breadboards, sensors, and acrylics from suppliers.	• Completed the working model within the allotted time and budget.

Image Processing Deep Learning Project– AI Theory &Programming Course



Goal	Process	Result
• Create a CNN from scratch using the CIFAR 100 dataset for training.	• Wrote the code for the model using **TensorFlow** and **Python**. • Adjusted the depth and width of the layers. • Randomly changed the rotation and color of images in the learning dataset	• Achieved a top-1-error accuracy of 57% and a top-5-error of 84%.